IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. :	**10/720,308**	Confirmation No. 4719

Applicant : Y. KANEDA et al

Filed : November 25, 2003

Title : DATA STORAGE SYSTEM, DATA STORAGE
APPARATUS, COMPUTERS AND PROGRAMS

TC/AU : 2131

Examiner : TBD

Docket No. : H-1121

Customer No.: 24956

REQUEST FOR RECONSIDERATION
AND
RENEWED PETITION TO MAKE SPECIAL
(ACCELERATED EXAMINATION UNDER MPEP § 708.02(VIII))

Sir:

In response to the Decision on Petition to Make Special mailed May 12, 2005,

wherein the Petition was dismissed, the Applicants request reconsideration of their

petition to the Commissioner to make the above-identified application special in

accordance with 37 CFR §1.102(d) and MPEP § 708.02(VIII).

I. ## RESPONSE TO DISMISSAL

The Petition was dismissed on the grounds that the discussion of the

references deemed most-closely related to the invention did not adequately discuss

how each of the independent claims was specifically distinguishable and patentable

over the references. In response, the Petition has been revised to more clearly point

out to the Examiner how each of the independent claims 1 and 7-13 is patentable

over the references deemed most-closely related to the subject matter encompassed

by the claims.

II.   RENEWED PETITION TO MAKE SPECIAL

Applicants renew their petition to the Commissioner to make the above-

identified application special in accordance with 37 CFR §1.102(d) and request

reconsideration. In support of this Petition, pursuant to MPEP § 708.02(VIII),

Applicants state the following.

(A)   REQUIRED FEE

This Petition was accompanied by the fee set forth in 37 CFR § 1.117(h) when

originally filed on February 23, 2005. No additional fee is believed to be required;

however, the Commissioner is hereby authorized to charge any additional payment

due, or to credit any overpayment, to Deposit Account No. 50-1417.

(B)   ALL CLAIMS DIRECTED TO A SINGLE INVENTION

Following a Preliminary Amendment filed on the same date as this paper,

claims 1-13 remain pending in the application. All the pending claims of the

application, claims 1-13 are directed to a single invention. If the Office determines

that all claims in the application are not directed to a single invention, Applicant will

make election without traverse as a prerequisite to the grant of special status in conformity with established telephone restriction practice.

Additionally, it is noted that the Preliminary Amendment merely makes the claim language used in the independent claims more uniform and corrects minor informalities, rather than adding any new matter limitations to the amended claims. Accordingly, the search originally conducted for this Petition is not required to be updated for this Renewed Petition, as the subject matter to which the claims are directed has not been changed by the Preliminary Amendment.

The claimed invention, as set forth in independent claims 1, and 7-13, is generally directed to a data storage system having the capability of efficiently-providing a large number of volumes. As set forth in claim 1, the invention is a data storage system having a computer and a data storage apparatus, which has a plurality of storage volumes for storing data to be accessed by said computer, wherein: said data storage apparatus comprises: a management unit for generating a response to said computer for recognizing a virtual drive unit capable of treating said storage volume that is non-removable as a removable storage medium; and a storing unit for storing volume management information indicating the correspondent relationship between said virtual drive unit and said storage volume, and said computer comprises: an interface for receiving said response; and a management unit for recognizing said virtual drive unit based on said response, and the management unit of said data storage apparatus specifies said storage volume to be

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accessed based on an access request from said computer to said virtual drive unit, and said volume management information.

Additionally, as set forth in claim 7, the invention is a data storage apparatus having a plurality of storage volumes for storing data to be accessed by a computer, comprising: a management unit for generating a response to said computer for recognizing a virtual drive unit capable of treating said storage volume that is non-removable as a removable storage medium; and a storing unit for storing volume management information indicating the correspondent relationship between said virtual drive unit and said storage volume, wherein: said management unit specifies said storage volume to be accessed based on an access request from said computer to said virtual drive unit, and said volume management information.

Also, as set forth in claim 8, the invention is directed to a computer for accessing data stored in a plurality of storage volumes in a data storage apparatus, comprising: an interface for receiving a response from said data storage apparatus for recognizing a virtual drive unit capable of treating said storage volume that is non-removable as a removable storage medium; and a management unit for recognizing, on the basis of said response, a virtual drive unit to which said storage volume that is non-removable is connected as a removable storage medium.

Furthermore, as set forth in claim 9, the invention is directed to a connecting apparatus for managing the correspondent relationship between a computer and a data storage apparatus having a plurality of storage volumes for storing data to be accessed by said computer, comprising: a management unit for generating a

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response to said computer for recognizing a virtual drive unit capable of treating said storage volume that is non-removable as a removable storage medium; and a storing unit for storing volume management information indicating the correspondent relationships between said virtual drive unit and said storage volumes, wherein: said management unit specifies said storage volume to be accessed based on an access request from said computer to said virtual drive unit, and said volume management information.

In addition, as set forth in claim 10, the invention is directed to a program for managing access to data stored in a plurality of storage volumes in a data storage apparatus, said program causing a computer to execute: a function for receiving a response from said data storage apparatus for recognizing a virtual drive unit capable of treating said storage volume that is non-removable as a removable storage medium; and a function for recognizing, on the basis of said response, a virtual drive unit to which said storage volume that is non-removable is connected as a removable storage medium.

Additionally, as set forth in claim 11, the invention is directed to a program for managing access to data stored in a plurality of storage volumes in a data storage apparatus, said program causing a computer to execute: a function for generating a response to said computer for recognizing a virtual drive unit capable of treating said storage volume that is non-removable as a removable storage medium; a function for storing volume management information indicating the correspondent relationship between said virtual drive unit and said storage volume; and a function for specifying

said storage volume to be accessed based on an access request from said computer to said virtual drive unit, and said volume management information.

Furthermore, as set forth in claim 12, the invention is directed to a method for managing access to data stored in a plurality of storage volumes in a data storage apparatus, comprising the steps of: receiving a response from said data storage apparatus for recognizing a virtual drive unit capable of treating said storage volume that is non-removable as a removable storage medium; and recognizing, on the basis of said response, a virtual drive unit to which said storage volume that is non-removable is connected as a removable storage medium.

Finally, as set forth in claim 13, the invention is directed to a method for managing access to data stored in a plurality of storage volumes in a data storage apparatus, comprising the steps of: generating a response to said computer for recognizing a virtual drive unit capable of treating said storage volume that is non-removable as a removable storage medium; storing volume management information indicating the correspondent relationship between said virtual drive unit and said storage volume; and specifying said storage volume to be accessed based on an access request from said computer to said virtual drive unit, and said volume management information.

(C)   PRE-EXAMINATION SEARCH

A pre-examination search has been conducted, directed to the invention as

claimed. The pre-examination search was conducted in the following US Manual of

Classification areas:

Class	Subclass
710	72, 74
711	111, 112, 114, 202

Furthermore, a keyword search was conducted on the USPTO's EAST

database. Additionally, a literature search was conducted for relevant non-patent

documents using the DIALOG online databases. In addition, a search for foreign

patent documents was conducted on the European Patent Office's ESPACENET

databases.

(D)   REFERENCES DEEMED MOST-CLOSELY RELATED TO THE SUBJECT MATTER ENCOMPASSED BY THE CLAIMS

Based upon a review of the documents located by the search and the

documents already of record in the application, the references deemed to be most-

closely related to the subject matter encompassed by the claims are listed below.

These documents were made of record in the present application by the Information

Disclosure Statements filed January 19, 2005, and December 9, 2003.

Document No.	Inventor
US 5963971	Fosler, Christine L. et al.
US 6304940	Beardsley, Brent Cameron
US 20020069245	Kim, Han-Gyoo
US 20030204700	Biessener, David W. et al.
US 20030212859	Ellis, Robert W. et al.

Publication
Baker, Arthur H., The Windows NT Device Driver Book, Prentice Hall,
USA, 1997, pp. 62-71.

Because all of the above-listed documents are already of record in the present

application, in accordance with MPEP § 708.02(VIII)(D), additional copies of these

documents have not been submitted with this Petition.

(E)   DETAILED DISCUSSION OF THE REFERENCES

The references deemed most-closely related are discussed below in Section

(E)2, pointing out, with the particularity required by 37 CFR 1.111 (b) and (c), how

the claimed subject matter is patentable over the teachings of these documents.

1.   Discussion of the Invention

The present invention provides for managing and controlling volumes in a

large-scale data storage apparatus typified by a disk array apparatus maintaining a

large number of storage volumes. The data storage apparatus is able to carry out

emulation for recognizing a virtual drive unit capable of treating a non-removable

data storage apparatus as a removable data storage medium. Also, by storing

volume management information indicating the corresponding relationship between

virtually loaded drives and volumes in a storage system, mounting is not carried out

for all volumes, thereby reducing the amount of memory required when mounting a

volume, and shortening computer startup time. It is submitted that the cited

references, whether taken individually, or in combination, fail to teach or suggest the invention as claimed in independent claims 1 and 7-13.

As recited in independent claims 1, 7, 9, 11, and 13, a first feature of the invention includes generating a response to a computer for recognizing a virtual drive unit capable of treating a storage volume that is non-removable as a removable storage medium.

Further, as recited in independent claims 8, 10 and 12, a second feature of the invention includes receiving a response from a data storage apparatus for recognizing a virtual drive unit capable of treating a storage volume that is non-removable as a removable storage medium.

As will be discussed in more detail below, the prior art does not teach or suggest the above-described features of claims 1 and 7-13, in combination with the other limitations of these claims.

2.   Discussion of the References Deemed to be Most-Closely Related

The patent to Fosler et al., US 5963971, shows a data storage subsystem in which a virtual removable media server handles host audit requests, regardless of whether the requests are directed to a physical volume or a virtual volume physically stored in cache or in a removable physical media item. One or more hosts are connected to a data storage subsystem. A storage interface interconnects the hosts with a cache and also with a physical media library. The hosts issue commands in an appropriate format to removable data storage in a virtual data storage library.

The virtual library and perceived media items do not actually exist. Instead, the storage interface emulates the perceived storage library in its communication with the hosts. Data is actually stored by the cache and/or the physical library. (See, e.g., Abstract; column 2, line 19, through column 3, line 11; and column 3, line 45, through column 4, line 9.) Thus, Fosler et al. teach the use of a system which emulates a removable media server, unlike the present invention, wherein a virtual drive unit is capable of treating a storage volume that is non-removable as a removable storage medium. More particularly, Fosler et al. do not teach generating a response to a computer for recognizing a virtual drive unit capable of treating a storage volume that is non-removable as a removable storage medium, in combination with the other limitations recited in claims 1, 7, 9, 11, and 13. Similarly, Fosler et al. do not teach receiving a response from a data storage apparatus for recognizing a virtual drive unit capable of treating a storage volume that is non-removable as a removable storage medium, in combination with the other limitations recited in claims 8, 10 and 12. Accordingly, claims 1 and 7-13 are patentable over Fosler et al.

The patent to Beardsley, US 6304940, shows a direct access data storage system in which records are mapped into fixed block architecture (FBA) data records so as to appear to an FBA controller and an AIX host as a removable media having a preset directory. A mapped FBA shadow volume, which is the shadow volume as it appears to the FBA controller, may be identified to the FBA controller and to the AIX

host as though it is configured as a volume on one of two types of devices: (1) a "raw

disk" in which the data blocks will be treated as normal FBA space for both reading

and writing by the AIX host, or (2) as "removable media" having a preset directory,

such as a read-only CD-ROM, or a read-only DVD disk. The appearance to an AIX

host as a device having a preset directory simplifies and speeds the operation of the

AIX host. (See, e.g., Abstract and column 6, lines 21-46.) Thus, while Beardsley

utilizes a fixed block architecture treated as a removable media, Beardsley does not

teach the present invention, wherein a response is generated or received for

recognizing a virtual drive unit capable of treating a storage volume that is non-

removable as a removable storage medium. More particularly, Beardsley does not

teach generating a response to a computer for recognizing a virtual drive unit

capable of treating a storage volume that is non-removable as a removable storage

medium, in combination with the other limitations recited in claims 1, 7, 9, 11, and 13.

Similarly, Beardsley does not teach receiving a response from a data storage

apparatus for recognizing a virtual drive unit capable of treating a storage volume

that is non-removable as a removable storage medium, in combination with the other

limitations recited in claims 8, 10 and 12. Accordingly, claims 1 and 7-13 are

patentable over Beardsley.

The published US patent application to Kim, US 20020069245, shows a

network-attached disk (NAD) system in which a host computer is connected via a

network to the NAD. The NAD is treated as a local disk capable of dynamic addition

or removal. The conventional bus driver and port driver are replaced with a new bus driver and port driver so that the NAD devices can be recognized as the same as local disks and the disk I/O operations can be performed to the NAD devices through the network port of the host. (See, e.g., Abstract and paragraphs 12, 69-95, and 107-112.) Thus, Kim does not disclose treating a storage volume that is non-removable as a removable storage medium. More particularly, Kim does not teach generating a response to a computer for recognizing a virtual drive unit capable of treating a storage volume that is non-removable as a removable storage medium, in combination with the other limitations recited in claims 1, 7, 9, 11, and 13. Similarly, Kim does not teach receiving a response from a data storage apparatus for recognizing a virtual drive unit capable of treating a storage volume that is non-removable as a removable storage medium, in combination with the other limitations recited in claims 8, 10 and 12. Accordingly, claims 1 and 7-13 are patentable over Kim.

The published US patent application to Biessener et al., US 20030204700, shows a storage system having one or more physical storage devices and a controller which maintains a virtual physical drive map, and maps the virtual physical drives (VPDs) to storage media of the physical storage devices. A user may define an arbitrary number of VPDs, but since only two VPDs may be online at a given time, the user may define a single boot VPD, and configure the other VPDs as removable drives. (See, e.g., Abstract and paragraphs 7-12 and 67-73.) Thus, in Biessener et

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al., the user configures the virtual drives as removable drives, whereas in the present invention, a response is generated to a computer or received for recognizing a virtual drive unit. More particularly, Biessener et al. do not teach generating a response to a computer for recognizing a virtual drive unit capable of treating a storage volume that is non-removable as a removable storage medium, in combination with the other limitations recited in claims 1, 7, 9, 11, and 13. Similarly, Biessener et al. do not teach receiving a response from a data storage apparatus for recognizing a virtual drive unit capable of treating a storage volume that is non-removable as a removable storage medium, in combination with the other limitations recited in claims 8, 10 and 12. Accordingly, claims 1 and 7-13 are patentable over Biessener et al.

The published US patent application to Ellis et al., US 20030212859, shows a storage system controller that includes a plurality of media controllers, with each media controller having a storage media coupled thereto. The minimum configuration is one media controller used alone so as to make a normally fixed storage media, such as an ATA drive, appear as a removable storage media, such as a hot swappable ATA drive. (See, e.g., Abstract and paragraphs 41-42.) However, Ellis et al. do not teach the present invention, in which a virtual drive unit is capable of treating a storage volume that is non-removable as a removable storage medium. More particularly, Ellis et al. do not teach generating a response to a computer for recognizing a virtual drive unit capable of treating a storage volume that is non-removable as a removable storage medium, in combination with the other

limitations recited in claims 1, 7, 9, 11, and 13. Similarly, Ellis et al. do not teach receiving a response from a data storage apparatus for recognizing a virtual drive unit capable of treating a storage volume that is non-removable as a removable storage medium, in combination with the other limitations recited in claims 8, 10 and 12. Accordingly, claims 1 and 7-13 are patentable over Ellis et al.

The publication to Baker, "The Windows NT Device Driver Book", provides a general discussion of I/O request packets, driver objects, device objects, and device extensions. Accordingly, Baker is of only general interest to the independent claims of the present invention as background information. Thus, Baker provides no teaching or suggestion of a virtual drive unit capable of treating a storage volume that is non-removable as a removable storage medium. More particularly, Baker does not teach generating a response to a computer for recognizing a virtual drive unit capable of treating a storage volume that is non-removable as a removable storage medium, in combination with the other limitations recited in claims 1, 7, 9, 11, and 13. Similarly, Baker does not teach receiving a response from a data storage apparatus for recognizing a virtual drive unit capable of treating a storage volume that is non-removable as a removable storage medium, in combination with the other limitations recited in claims 8, 10 and 12.

(F)   CONCLUSION

As demonstrated by the above discussion, the references fail to teach or suggest generating a response to a computer for recognizing a virtual drive unit capable of treating a storage volume that is non-removable as a removable storage medium, in combination with the other limitations recited in claims 1, 7, 9, 11, and 13.

Similarly, the references fail to teach or suggest receiving a response from a data storage apparatus for recognizing a virtual drive unit capable of treating a storage volume that is non-removable as a removable storage medium, in combination with the other limitations recited in claims 8, 10 and 12.

Accordingly, it is submitted that all of these claims are patentable over the cited references taken individually, or in combination with each other. The remaining claims are dependent claims, claim additional features of the invention, and are patentable at least because they depend from allowable base claims. Accordingly, the requirements of 37 CFR §1.102(d) having been satisfied, the Applicants request that this Petition to Make Special be granted and that the application be examined according to prescribed procedures set forth in MPEP §708.02 (VIII).

The Applicants prepared this Petition in order to satisfy the requirements of 37 C.F.R. §1.102(d) and MPEP §708.02 (VIII). The pre-examination search required by these sections was "directed to the invention as claimed in the application for which special status is requested." MPEP §708.02 (VIII). The search performed in support of this Petition is believed to be in full compliance with the requirements of MPEP §708.02 (VIII); however, Applicants make no representation that the search covered

every conceivable search area containing relevant prior art. It is always possible that prior art of greater relevance to the claims may exist. The Applicants urge the Examiner to conduct his or her own complete search of the prior art, and to thoroughly examine this application in view of the prior art cited above and any other prior art that may be located by the Examiner's independent search.

Further, while the Applicants have identified and discussed certain portions of each cited reference in order to satisfy the requirement for a "detailed discussion of the references, which discussion points out, with the particularly required by 37 C.F.R. §1.111(b) and (c), how the claimed subject matter is patentable over the references" (MPEP §708.02(VIII)), the Examiner should not limit review of these documents to the identified portions, but rather is urged to review and consider the entirety of each reference.
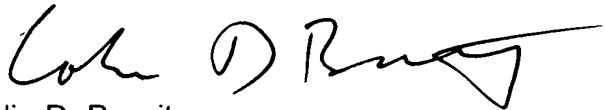
(G)   FEE PAYMENT (37 C.F.R. 1.17(h))

The fee required by 37 C.F.R. § 1.17(h) is to be paid by:

[ ]   the Credit Card Payment Form (attached) for $130.00.

[ ]   charging Account 50-1417 the sum of $130.00.

Please charge any shortage in fees due in connection with the filing of this

paper, including extension of time fees, or credit any overpayment of fees, to the

deposit account of MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C., Deposit

Account No. 50-1417.

Respectfully submitted,

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FORM PTO-1083

In RE application of   Y. KANEDA et al

Serial No.:   10/720,308

Filed: November 25, 2003

Group Art Unit: 2131

Examiner: TBD

For: DATA STORAGE SYSTEM, DATA STORAGE APPARATUS, COMPUTERS AND PROGRAMS

Assistant Commissioner for Patents
Washington, D.C.   20231

Sir:

Transmitted herewith is an Amendment in the above-identfied application.

☐ Small entity status of this application under 37 CFR 1.9 and 1.27 has been established by a verified statement previously submitted.

☐ A verified statement to establish small entity status under 37 CFR 1.9 and 1.27 is enclosed.

☐ No additional fee is required.

The fee has been calculated as shown below:

	(COL. 1) Claims Remaining After Amendment		(COL. 2) Highest No. Previously Paid For	(COL. 3) Present Extra	SMALL ENTITY Rate	Additional Fee	OR	OTHER THAN A SMALL ENTITY Rate	Additional Fee
Total	• 13	Minus	•• 20	= 0	x 9	$		x 18	$ 0
Indep.	• 8	Minus	••• 8	= 0	x 42	$		x 84	$ 0
☐ First Presentation of Multiple Dependent Claims					+ 140	$		+ 280	$ 0
					Total	$	OR	Total	$ 0

•   If the entry in Col. 1 is less than the entry in Col. 2, write '0' in Col. 3.
••   If the 'Highest Number Previously Paid For' IN THIS SPACE is less than 20, write '20' in this space.
•••   If the 'Highest Number Previously Paid For' IN THIS SPACE is less than 3, write '3' in this space.
      The 'Highest Number Previously Paid For' (Total or Independent) is the highest number found from the equivalent box in Col. 1 of a prior Amendment or the number of claims originally filed.

☐ Please charge my Deposit Account No. 50-1417 in the amount of $_____.

☐ A check in the amount of $_____ is attached in payment of:
_____.

☒ The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. 50-1417.

  ☒ Any filing fees under 37 CFR 1.16 for the presentation of extra claims.

  ☒ Any patent application processing fees under 37 CFR 1.17.

  ☒ Any Extension of Time fees that are necessary, which are hereby requested if necessary.

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Date: July 12, 2005